

## CLAIMS

### I CLAIM:

1. A waterjet propulsion apparatus comprising, in combination:
  - 5 a rotor comprising a plurality of rotor blades coupled to a hub;  
wherein said rotor has five said rotor blades;  
a first housing section surrounding said rotor;  
a stator comprising a plurality of stator blades coupled to a stator hub;  
wherein said stator has eight blades coupled to said stator hub; and  
10 a second housing section surrounding said stator.
2. The apparatus of Claim 1 wherein a total weight of said rotor blades is between about 110 to 120 lb.
- 15 3. The apparatus of Claim 1 wherein the total weight of said rotor blades is about 114 lb.
4. The apparatus of Claim 1 wherein total blade area of said rotor blades is between about 800 in<sup>2</sup> to 900 in<sup>2</sup>.
- 20 5. The apparatus of Claim 2 wherein total blade area of said rotor blades is about 854 in<sup>2</sup>.

6. The apparatus of Claim 1 wherein clearance between tips of said rotor blades and an interior surface of said first housing section is within the range of about 0.050" and 0.150".
- 5 7. The apparatus of Claim 5 wherein clearance between tips of said rotor blades and said interior surface of said first housing section is approximately 0.050".
8. The apparatus of Claim 1 wherein said second housing section defines a combined stator housing and nozzle.
- 10 9. The apparatus of Claim 7 wherein said second housing section tapers to from an upstream end having a first diameter to a downstream end having a second diameter that is smaller than said first diameter.
- 15 10. The apparatus of Claim 8 wherein a downstream end of said stator hub extends downstream of said downstream end of said second housing section.
11. The apparatus of Claim 1 wherein an internal diameter at a downstream end of said second housing section is in the range of from about eight to about ten
- 20 inches.
12. The apparatus of Claim 1 wherein said internal diameter is about 8.85 inches.

13. The apparatus of Claim 1 where a distance from a trailing end of said stator blades and a downstream end of said second housing section is in the range of from about one to about two inches.
- 5 14. The apparatus of Claim 12 wherein said distance is about 1.29 inches.
15. A waterjet propulsion apparatus comprising, in combination:  
a rotor comprising a plurality of rotor blades coupled to a hub;  
wherein said rotor has five said rotor blades;  
10 a first housing section surrounding said rotor;  
wherein clearance between tips of said rotor blades and an interior surface of said first housing section is within the range of about 0.050" and 0.150";  
a stator comprising a plurality of stator blades coupled to a stator hub;  
15 wherein said stator has eight blades coupled to said stator hub; and  
a second housing section surrounding said stator;  
wherein a distance from a trailing end of said stator blades and a downstream end of said second housing section is in the range of from about one to about two inches; and  
20 wherein an internal diameter at a downstream end of said second housing section is in the range of from about eight to about ten inches.
16. The apparatus of Claim 14 wherein clearance between tips of said rotor blades and said interior surface of said first housing section is approximately 0.050".

17. The apparatus of Claim 14 wherein said second housing section defines a combined stator housing and nozzle.

18. The apparatus of Claim 14 wherein said internal diameter is about 8.85 inches.

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19. The apparatus of Claim 14 wherein said distance is about 1.29 inches.

20. A waterjet propulsion apparatus comprising, in combination:

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a rotor comprising a plurality of rotor blades coupled to a hub;

wherein said rotor has five said rotor blades;

wherein a total weight of said rotor blades is about 114 lbm;

wherein total blade area of said rotor blades is about 854 in<sup>2</sup>;

a first housing section surrounding said rotor;

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wherein clearance between tips of said rotor blades and an interior surface of said first housing section is within the range of about 0.050" and 0.150";

a stator comprising a plurality of stator blades coupled to a stator hub;

wherein said stator has eight blades coupled to said stator hub; and

a second housing section surrounding said stator;

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wherein said second housing section defines a combined stator housing and nozzle;

wherein said second housing section tapers to from an upstream end having a first diameter to a downstream end having a second diameter that is smaller than said first diameter; and

wherein a downstream end of said stator hub extends downstream of said downstream end of said stator housing.

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21. The apparatus of Claim 20 wherein clearance between tips of said rotor blades and said interior surface of said first housing section is approximately 0.050".
22. The apparatus of Claim 20 further comprising non-uniform loading on the rotor blades.
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23. The apparatus of Claim 20 wherein the loading on the tip area of the rotor blade is greater than the loading on the hub area of the rotor blade.
24. The apparatus of Claim 20 having a pressure rise of approximately 99.4 ft H<sub>2</sub>O of approximately 16 mph watercraft speed.
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25. The apparatus of Claim 20 having a water flow of between approximately 95 to 105 ft<sup>3</sup>/sec at approximately 16 mph watercraft speed.